

DO SMALL-POX & COW-POX AFFORD
ANY PROTECTION FROM ASIATIC
CHOLERA?

WITH SOME OBSERVATIONS.

BY

AMBROSE BLACKLOCK,

SURGEON-MAJOR, H.M. MADRAS ARMY, &C., &C.

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DO SMALL-POX AND COW-POX AFFORD ANY PROTECTION FROM ASIATIC CHOLERA ?

I NEED not offer any apology for this hurriedly-written little Tract. Those who know much of Asiatic cholera will not, I am certain, sneer at any idea, however wide of practical bearing on the subject it may at first sight appear to be, but will be glad to afford to every view of the disease a fair amount of patient consideration.

I have, therefore, no hesitation in submitting the following statements to the Medical Profession, in the hope that those who have attended cases of Asiatic cholera may be induced to publish the results of their experience and observations on the points to which I ask for attention. The present is, unfortunately, but too favourable a period for enquiries of the kind. Though I have resided more than twenty-three years in India, where vaccination makes but slow progress among the people, and pock-pitted persons are to be seen in abundance, and where I have had a large number of cholera cases to attend to from year to year, I cannot remember ever having seen or heard of any person marked by pits of small-pox being affected with Asiatic cholera. The only approach to the cholera condition I have ever seen in a person so marked was in a patient distinctly pitted and suffering from old chronic diarrhœa sustained by ulceration of the intestines. A cholera epidemic came, and that man's diarrhœa became serous for a few hours, but he was readily restored to his previous state.

This remarkable fact in my experience has often occupied my thoughts during the last ten years. I have always expected to find cases that would dissipate my growing belief, but not having seen any, and having lately seriously considered the bearings of the subject, I am somewhat prepared now to take a step towards its settlement one way or another.

My impression also is, that persons who have had well-marked cow-pox at no distant period, say within five years, are fully protected from Asiatic cholera as well as

from small-pox. This, however, is not in my mind a positive fact, it is only an impression, but an impression strengthened to some extent by the known identity of the small-pox and cow-pox poisons which renders it highly probable that as persons with variolous marks have a singular immunity from cholera, those who have good vaccine scars, imprinted at a time not too remote, are also well-protected from cholera spasmodica. 2. By the comparative immunity of professional nurses and doctors from cholera appearing to me to be owing to the fact that as they have also at times to attend to small-pox cases, they take care to be always well-protected by vaccination, and are thus unknowingly protected also from cholera infection. 3. By the infrequency of cholera among the well-vaccinated Government students at the Madras Medical College, although they have at times very hard work in attending closely to cholera patients, and mostly reside in cholera localities; while those of the native classes are in many instances feeble from poor living, and therefore not good subjects for resisting any disease. 4. By the fact that during the three years from 1832, during which there was cholera hanging about our army in Great Britain, though the different bodies of troops were quartered as usual in various situations throughout the kingdom, yet the proportion of deaths from cholera was to within a fraction the same, or 2.8 per thousand among all.* Thus inclining me to believe that these various bodies being all under more than ordinarily favourable hygienic conditions must have everywhere had among themselves a certain proportion of subjects amenable to cholera poison, and amenable to it through wearing out of the protective power of their vaccination. Had the same bodies of men been quartered in India, where the protective power of cow-pock wears out faster than in a temperate climate, owing to the heat occasioning increase of waste and greater rapidity in the molecular changes of animal systems, their losses from cholera would most likely have been far higher.

Dr John Macpherson has in his recently-published work† given a table at page 4, which clearly shews that

* *Medico-Chirurgical Review*, vol. xxxi. of 1839, p. 8.

† *Cholera in its Home*, by John Macpherson, M.D., late Deputy Inspector-General of Hospitals H.M. Bengal Army, and formerly of the European Hospital, Calcutta. Churchill & Sons, London. 1866.

cholera and small-pox are intimately connected ; but he says at page 15, "there is no reason to suppose that the one malady exercises the slightest influence on the other." "At first sight there are many points of analogy in the course of small-pox and cholera." . . . "Yet we still find they differ much in their courses." He does not make any mention of the facts to which I now desire to direct attention.

The two diseases seem to run side by side, small-pox appearing usually a little before cholera in India, and continuing with it. On July 24th, 1866, the Earl of Shaftesbury in the House of Lords called attention to the increasing fatality of small-pox. He was informed that in the present year there were symptoms of a great increase of that epidemic, and that the small-pox was likely to spread more fatally than in any previous year. Cholera is now causing some alarm. "Some anxiety has been felt on account of the recent outbreak of small-pox in London. It has been ascertained that in Spitalfields,* where the epidemic has chiefly raged, there has been an utter neglect of vaccination."† According to the Return of the Registrar-General for the week that ended on 28th of last July, cholera and choleraic diarrhoea had occasioned a serious mortality in the six districts of Bethnal Green, Whitechapel, St. George-in-the-East, Stepney, Mile-end Old Town, and Poplar, including Bow. Three hundred and nine children, under five years of age, just those who should have been well under vaccinia, died in those districts in that week from choleraic diarrhoea. Any one reading the return, after reading this Tract, and not knowing the remarkable absence of vaccination in those places, would at once pronounce that I am wrong in my impressions as to vaccinia being preventive of cholera. I feel certain that enquiry will prove that vaccination, like more ordinary sanitary measures, has been as little attended to in the other districts where cholera has prevailed as in those included in Spitalfields. The dreadful destruction by small-pox will have left a smaller number

* Which includes large portions of Bethnal Green, Shoreditch, Whitechapel, and Mile-end New Town, and is bounded, according to Mr Charles Knight,† by Hacknoy Road on the north, Whitechapel and Mile-end Road on the south, Regent's Canal on the east, and Bishopgate Street on the west.

† "London," edited by Charles Knight, 1841, vol. ii., p. 387.

‡ Medical Press and Circular, August 1st, 1866, p. 137.

of unprotected to fall victims to cholera ; but numbers will still remain to prove whether those unprotected by vaccination are more liable to cholera than the protected. It is painful to have to write about such matters.

The small-pox and cholera poisons resemble each other in some respects in their manifestations, and differ widely in others. Perhaps the two are really identical, the small-pox poison being merely an allotropic of the other and more deadly form. Each seems to be a proximate principle, soluble in air, water, and ammonia ; yet we know nothing of them except by their effects, as we have never been able to obtain them by themselves.

The same animal poison produces different effects in different individuals. Two men partake of the same poisonous fish. One has severe choleraic diarrhœa, and probably is killed. The other has only severe asthma, or jaundice, or nettle rash, or all three together, and survives. It may be, therefore, that the cholera and small-pox poisons are one and the same, but acting differently on different individuals, according to the constitution of the air at the moment, or to the state of health of the individuals themselves. When small-pox appears in an epidemic form, it progresses for some weeks or months till the public health becomes generally lowered, and then cholera appears ; visceral disease, especially determinations to the abdomen, being evidence of a more depressing epidemic constitution of the atmosphere than a disease which expresses itself mainly on the cutaneous surface. If the morbid material of small-pox were to pass from the skin in a form as fluid as the discharges of a cholera patient, and be carried into our drinking water, we might have more serious disease from it than it has hitherto occasioned.

A very slight change may, for anything we know to the contrary, occasion a great alteration in the properties of any animal poison. That dangerous chemical phosphorus is so changed (rendered allotropic) by being subjected to heat under water in an air-tight cast-iron boiler to a temperature of 450° for three or four weeks that "although it is only phosphorus in an altered molecular condition, it has no poisonous properties." Although the two varieties (the common and allotropic phosphorous) are easily convertible into each other, they differ as much in properties as any two metalloids or metals.* To come nearer

* Brande and Taylor's Chemistry, 1863, pp. 268, 269.

to our subject, however, we know that a very slight alteration in some medicines will alter their powers very much. Oxide of antimony, when taken with an alkali, so as to prevent acidity of stomach, increases the capillary circulation of the skin, and induces perspiration. Given with a mineral acid, or by itself in an acid state of stomach, a moderate dose will bring on vomiting, purging, cramps, coldness of surface, husky voice, and other resemblances of Asiatic cholera.

The vaccine essence is to the variolous very much what allotropic phosphorus is to ordinary phosphorus. The ordinary phosphorus, prone to dangerous combustion, is rendered so inert and harmless by long exposure to close heat that it will not take fire by any exposure to oxygen or friction. By passing malignant variolous matter through the cow, we obtain a milder, may we say an allotropic, essence, which produces on us only the benignant and long protecting pustule we name the cow-pock. The one has every tendency to kill, and is a destroyer; the other fortifies our constitutions, and is a guardian; so virulence becomes benign, the enemy a friend.

Why may not the cholera essence be only a very virulent essence of small-pox? We have several forms of carbon, as diamond, charcoal, anthracite, graphite. We have it also in a gaseous form in combination with oxygen. Each capable of effecting what the other cannot exactly do. Possibly all our zymotic diseases may be really one in essence, but each having peculiarities different from those of the others, owing to the circumstances in which each has been developed. This is no new idea, and its correctness is rendered the more probable by the fact that by adopting strict sanitary precautions against any one of the zymotics, we do much to protect ourselves from the others.

Professor William Aitken, of the Army Medical School, says—"The alimentary canal in some instances has presented a mamillated appearance, caused by an enlargement of the tubular glands, from which a white opaque fluid can be squeezed out, and the mamillated appearance effaced."* And writing of what he saw of cholera at Scutari in 1855: "The appearance of eruption in such cases is due to the solitary mucous glands, which are filled with exudation not of a purulent kind, but having all the exter-

* Science and Practice of Medicine, by Professor Aitken, vol. i., p. 637.

nal appearance of pustules."* Kolliher says "that Bohm's observations lead us to suppose that the whitish viscid secretion in the tubular glands of intestine was nothing else than the epithelium which had detached itself from the walls and collected in form of a compact plug."

Dr Hassal, in vol. II. of his *Microscopic Anatomy of the Human Body*, figure 6, plate 52, gives the appearance of the solitary glands of the small intestines as they occurred in a case of muco-enterite; and in figure 6, plate 51, he has depicted the same glands of the large intestine in a case of cholera in a child. Asiatic cholera sometimes begins as a muco-enterite. Dr Hassal, however, does not speak of the tubules in the above instances being in a pustular state.

In a pamphlet which I issued several years ago I said—"The most marked instance which I have seen of the pustular formation in the follicles of the intestine was in a case (in 1840) where the patient survived three days from the commencement of the attack, and died worn out by continued irritation of the nervous system, with remittent serous purging; and in this instance the eruption was well defined, and extended from the anus to six inches above the iliac valve. In another case, where the patient fairly recovered from a severe and protracted attack of cholera, and died suddenly ten days after from pulmonary apoplexy, induced by over dieting, there was, as might have been expected, no eruption, but in its place an extensive sheet of very small ulcerations throughout the colon, chiefly just above the sigmoid flexure."† I had not a microscope in those days.

We must not forget that a perfect pustule is not likely to be formed on an intestinal surface in less than five days, and most cholera cases never live to that period.

There is eruptive and non-eruptive typhus, eruptive and non-eruptive typhoid, we recognise also fatal variolae sine eruptione. It would not, therefore, be very surprising to find that an intestinal *pustular* eruption is sometimes present, sometimes absent in Asiatic cholera. Absent almost invariably, at least always imperfect when we have had an opportunity of looking for it, because

* *The Science and Practice of Medicine*, by Professor Aitken, vol. i., p. 251.

† *The Leading Phenomena of Epidemic Cholera*, by Ambrose Blacklock, Assistant-Surgeon Madras Medical Establishment, 15th Sept., 1848. Madras American Mission Press, p. 46.

the determination of the blood poison to the intestines at the very outset of the disease sinks the vital power, and destroys life before there is time for the poison's elaboration by a suppurative process. Possibly the eruptive process is completed, and the poison eliminated by suppuration only in those cases where choleraic-diarrhœa receives timely attention, and serous discharges are prevented by the ordinary remedies. And we know that the elimination of animal poison by the intestinal glands, and their actual softening and ulceration under the process, does not always cause diarrhœa, as we occasionally see in cases of typhoid, where the bowels have remained perfectly quiet, notwithstanding the iliac ulceration. Professor Aitken says—The enlargement of the follicles (of the intestines) is supposed to be peculiar to those cases in which diarrhœa, or other disorder of the alimentary canal, had for some time preceded the fatal attack. This development bears no relation to the intensity of the disease, being often most conspicuous in the least severe cases; and it is an appearance now considered of secondary importance, and consequent on the purging. In the experience of Dr W. T. Gardner it has been found in about two-thirds of the cases.* Just what might have been expected, the least severe cases being most likely those which, from a smaller than ordinary dose of the poison, survived long enough to afford time for its expression by the follicles.

Even if the person live long enough for pus to be developed in the follicles, pustules will seldom or never be found on examination after death, because a mucous pustule must be readily burst, and only a small, shallow, not-easily-noticed ulceration can be expected in its stead. Rokitansky says, speaking of exanthemata upon mucous membranes, "The study of this portion of the anatomy of mucous membrane is attended with great difficulties; for, with the exception of some of the processes, . . . such as typhus and dysentery, they occur so seldom, the products of the exanthemata are so delicate, and there is such loss of colour and collapse of the membrane after death, that very little is known about it."†

Though the best observers of the state of the intestinal

* The Science and Practice of Medicine by Professor Aitken. Vol. i., p. 638.

† Rokitansky's Pathological Anatomy, published by the Sydenham Society, vol. iii., p. 58.

follicles are, as I have shown above, decidedly against the supposition that pus is ever found in them, we have the opinion of one of the very greatest pathologists, Rokitausky, that very little is known about intestinal exanthemata, and that there are great difficulties in the way of our extending our very small actual knowledge of them. I may therefore be excused for considering that the probabilities are in favour of cholera being accompanied by an eruptive disease of the bowels. Sydenham, writing of the epidemic constitution of the years 1667, 1668, and part of 1669, in London, says "At the same time that the small-pox began to show itself, a new form of fever arose. With the exception of the eruption of pustules and the symptoms that depend thereon, it was not much unlike small-pox. (He names it in another place variolous fever.) A third disease accompanied these two epidemics, especially during the summer of the last year, this was diarrhœa, (1669). At that time the atmospheric constitution was inclining towards the subsequent dysentery. Be this, however, as it may, it was certain that the diarrhœa was so closely akin to the fever that it came in contact with (the fever not unlike small-pox), that it looked like a fever turned inwards, and attacking the viscera.* Moreover, at the beginning of 1669 the cholera of Sydenham's time set in sharply, though it had usually prior to that time appeared only in autumn,† There was thus in that year, an epidemic influence affecting at one time the bowels, at another the skin; one of the forms of the bowel complaint giving Sydenham the impression that it was of a variolous nature. This is the nearest approach to conversion of the one disease into the other, that I have seen recognised by any author.

It is now a matter of certainty that the cholera poison, however it may at first originate, is developed afterwards during the decomposition of the emanations, especially the discharges from the bowels of those suffering from it. But the poison is developed only as the late Professor Alison, of Edinburgh, years ago observed, "in a *particular stage* of that decomposition, not immediately after its formation in, or discharge from, the body, and again not after the decomposition has gone to a certain

* Werks of Sydenham published by the Sydenham Society, vol. i., pp. 121, 122.

† Idem, p. 159.

length.”* Long before Professor Alison had given his attention to the development and spread of zymotic poisons by the incipient decomposition of their organic envelopes, Liebig had stated that “all the observations hitherto made upon gaseous contagious matters prove that they are substances in a state of decomposition. When vessels filled with ice are placed in air impregnated with gaseous contagious matter, their outer surfaces become covered with water containing a certain quantity of this matter in solution. The water soon becomes turbid, and, in common language, putrifies; or, to describe the change more correctly, the state of decomposition of the dissolved contagious matter is completed in the water. The odour of gaseous contagious matters is generally accompanied by ammonia, which may be considered in many cases as the means through which the contagious matter receives a gaseous form. . . . Ammonia is very generally produced in cases of disease; it is always emitted in those in which contagion is generated (Liebig should have said ‘infection’ as well), and is an invariable product of the decomposition of animal matter. The presence of ammonia in the air of chambers in which diseased patients lie, particularly of those afflicted with a contagious disease, may be readily detected, for the moisture condensed by the ice, in the manner just described, produces a white precipitate in a solution of corrosive sublimate, just as a solution of ammonia does. . . . By evaporating acids in air containing gaseous contagions, the ammonia is neutralized, and we thus prevent further decomposition, and destroy the power of the contagion—that is, its state of chemical change.”†

In the zymotic diseases the affected person gets into a very low state; partial decomposition of his fluids must set in before the essence of the disease can be carried out of him so as to allow him to recover. Vitality must be reduced so low as to permit chemistry to come into play, that a fitting gaseous solvent may be found for the virulent essence, and float it away, to the saving of the patient, if he is not too much reduced by that time, but to the injury and perhaps death of others who may inhale the floating matters. The success which has attended the exhibition of ammonia as a medicine, in the

* Edin. Medical Journal for Nov. 1855, p. 390.

† Medico-Chirurgical Review, 1841, vol. xxxiv., p. 3. Extra Limites.

early stages of some zymotic diseases, instead of waiting till the system is so exhausted as to form it for itself, may be owing to the speedy solution and washing out of the poison by the ammoniacal vapour. Given late in any zymotic disease, ammonia acts as a severe depressant, for there is then more ammonia than enough in the system. It is then, as in the typhoid states, that we find so much benefit by tempering and allaying the ammonia by the exhibition of hydrochloric acid.

We obtain the essences of variola and vaccinia in the smallest compass easily in their respective lymphæ. The careful evaporation and drying of cholera exuviae would likely give us its essence also. Ammonia would float it and diffuse it, and make it a death dealer. It is only when cholera evacuations are beginning to be ammoniacal that they become capable of mischief. When they are so putrid as to be past the ammoniacal stage, they are harmless. The low case of cholera, with the peculiar far extending bad odour, is always to be dreaded on account of its infecting power. In dry hot weather the cholera essence, in the form of fine animal dust, must be blown about everywhere, and must get into the system by the lungs, and into the stomach with the food. If this dust gets into a damp close place in any house, the essence must be soon set free, and carried into the air in a gaseous form by the ammonia which is constantly nascent in such places. Moderate gentle showers acting on such dust in calm weather will allow the organic envelope to putrify, and so the essence will be set free and rise into the air, and be carried in watery solution into wells. A very heavy rain and high winds will wash it away or render it inert by free oxidation or dilution. Thus cholera spreads fast in hot dry weather and moderately wet close weather, and is terminated by storms of rain.

Well water contaminated with animal matter, and so liable to contain cholera poison, has been shown to be usually pleasant to drink. Part of the poison is carried into the wells with free ammonia and animal matter; part, with the ammonia, is oxidised in its passage through the soil with the potass of the animal matter. Hence such drinking waters are charged with cholera poison, and made to taste cool and pleasant by the nitrate of potass. Well-to-do people residing in dwellings quite free from sanitary defects, are doubtless often destroyed by cholera essence brought to them in drinking water from a distance.

Ammonia is one of the choicest vehicles of cholera essence. Wherever there is a low lying, damp, dirty, badly ventilated place, full of decaying organic matter, generating ammonia, there the cholera essence rides as a destroying angel if it be brought to the locality. Hence the great destruction occasioned by privies and cess-pools into which cholera dejections have been thrown. It is probable that the non-communicability of cow-pock through the medium of the atmosphere, its essence not being a pneumatic poison like the essence of cholera, and small-pox is owing to an allotropic peculiarity rendering it insoluble in ammonia, and therefore indiffusible.

Surprise is sometimes expressed that cholera should be generated at any time in cold countries like Russia. But though the cold outer air is inimical to the spread of the essence in such a country in winter, the heat and closeness of the stove-fitted apartments which the people select for comfort, and the thick, seldom-changed, highly animalized fur and woollen garments, must promote the formation of ammonia, and energize and diffuse the essence.

The greatest disseminators of cholera in eastern countries are the pilgrims and beggars. These vagabonds seldom or never wash either themselves or their clothes, when they have any. They prize a bit of woollen garment, and usually wear it till it falls off them from decay. They exhale an old hircine caseate of ammonia odour. The mischief they do, and the certainty with which cholera can be conveyed by dirty persons and dirty clothing, is well exhibited in the following extract from a very valuable paper by, I believe, Dr Eyre, late Deputy Inspector-General H.M. Madras Army. I am not quite certain that I have named the real author of the paper, as I unfortunately omitted his name in the notes I made from it at the time of its publication:—

“The 18th Regiment (Madras Native Infantry) was in Goomsoor (1845) where, in consequence of the disturbed state of the country, it was necessary to establish a chain of posts, extending for fifty miles or more along the bank of the Mahanuddee. They had not been long posted before reports reached head-quarters that cholera had broken out among them. This caused surprise, for the disease had not been heard of in any part of the country, or on either bank of the river. Inquiry cleared it up. A party of pilgrims journeying from Juggernaut to the westward, and who had cholera among them, had taken the

river road, and made their halts each day at one of the posts, and there left the disease. But, on the reports from all the posts coming in, it was found that two had altogether escaped. Explanation was sought, and a satisfactory reason obtained. The officer commanding one of the exempt posts, having intelligence of the party of infected pilgrims, judiciously crossed the river; but then, as if to frustrate this explanation, it appeared that the other detachment did not quit the post. An explanation cleared up this difficulty also. They occupied a neck of land, formed by the river at that part, making an abrupt bend to the northward, and this removed them so far from the road that the pilgrims did not turn off to visit them." *

The question now is not "Whether cholera is contagious or not, but *how often* it spreads by *the agency of human bodies* (i.e., by contagion), and how often without that agency."† The late Professor Alison of Edinburgh proved that the first case which occurred in Leith in 1832 was occasioned by contact with a case from Musselburgh, and that the first persons who took the disease in Arbroath in 1853 were two who had been with persons ill of cholera at Dundee.‡ Numerous instances have been brought forward since that date to prove that cholera can be carried from place to place. It is sometimes introduced, like other zymotic diseases, into the best ordered and most favourably situated houses by servants and other residents who have recently resided for a time in infected localities. It is also introduced occasionally into the best houses by clothes made or washed in such localities. The story of Hercules dying from wearing a poisoned tunic sent to him by Dejanira was devised by some Ancient, long long ago, to show that zymotic poisons could be transmitted by clothing.

It is right and best for us that we should look these things in the face. It is the only way to enable us to pluck "the flower safety from the nettle danger." And if we act as we should, we have nothing to fear, and much to be satisfied with in so doing. We may, without risk of contradiction, aver that cholera never spreads when brought into a clean, dry, well-ventilated, well-solarized, and therefore well-ozonised house. The factors for the

* Indian Annals of Medical Science, vol. ii., p. 42.

† British and Foreign Medical Review, January, 1854, p. 298.

‡ Edinburgh Medical Journal, November 1855, pp. 388, 9.

propagation and spread of cholera essence are a damp, warm, darkish locality, with animal and vegetable dirt to generate ammonia. Convey the cholera essence to such a place in a dirty old garment, which has been in an infected locality, and its diffusion begins. Test the condition of the place in a day or two by putting into it an *unprotected* human being (if he is rather young or rather old, or previously weakened by disease or scanty diet, so as to absorb the essence the more readily, the more delicate he will be as a zymotic test), and he will show you the working of the essence. If there is certain low epidemic constitution of the air at the time, no man can say how far the disease will spread when thus begun. It is when introduced into such places that cholera works its greatest mischief; and we have ourselves to blame when such places exist. Were the civilised world kept clean and wholesome, and protected by all sanitary means, zymotic diseases, such as cholera and typhus, would die out through want of suitable places and material to make new cases.

As to solarization of air—the kindly Irishman unconsciously uttered a good thing in sanitation when he wished that the sun might shine on both sides of his friend's house. A house with a face to the east and another to the west has the sun's rays through it almost every day, if it has proper doors and windows, and the chemical or energizing rays which accompany the luminous, sharpen or ozonise the oxygen of the air, and so make short work of the hydrogen and ammonia which is everywhere in some state, either alone or in some combination, in most residences. Of course a house may have such pollutions in or about it as will generate more hydrogen and ammonia than ozone can ever destroy. But when a house is so placed that the sunlight can get freely through it, other sanitary essentials being attended to, it will be found to be a good house for the preservation of health and for recovery from disease. Window gardening does more than refine and give pleasure to the minds of the poor: it leads them to clean and often open their windows, and solicit the air and sunshine.

All houses in low-lying damp neighbourhoods, where the winds have not free access, should be thoroughly fumigated with some acid gas when cholera is approaching, and occasionally during its stay. Sulphur yields sulphurous acid readily merely by setting it on fire.

One hundred grains, burnt in a room of ordinary size, with doors and windows shut, after the people are cleared out of it, will be enough for one disinfection. All old clothing or bedding which has been much used should be suspended loosely in the room before the sulphur is lighted, so that they may be disinfected at the same time. The colours of such clothing will be little affected if it is dry. If blankets, or any white flannels, are yellow from age, they should be dampened before suspension, and then the sulphuring will make them white. There is surely nothing very difficult in this process. A poor straw bonnet cleaner manages easily to whiten the straw by wetting it a little, and then hanging it in a barrel with a few grains of burning sulphur at the bottom before the lid is put on. Other people might, therefore, easily give their rooms and themselves the benefit of a few whiffs of sulphurous gas every second or third day at farthest. In the good old days of sulphur matches, thirty-five years ago at least, when Lucifers were almost unknown, every house in the land had sulphur burned in most parts of it every day. Small though the daily quantity of sulphurous gas evolved in that way, it must have done much to keep the air of the houses pure. Then in those days the people of Scotland were fond of an occasional dose of sulphur, and put faith in it, and believed it benefited their skins, and intestinal and bronchial mucous membranes. Of course, when taking their pinches of sulphur, part of it was oxidized in their capillaries, and sulphurous acid, or the acid united with the chief alkali of the blood, was circulated as sulphite of soda, and so disinfected the blood, if there was any infection in it, till the sulphite was discharged as a sulphate. Therefore sulphites in medicine are no new things. When I wrote the pamphlet I have quoted from at page 8, I recommended a pinch of sulphur daily as a prophylactic against cholera. I gave a most elaborate reason for my belief that it had prophylactic properties, but now that Continental physicians have shown how beneficial sulphurous acid is in zymotic diseases, the above explanation has occurred to me as better than that in my pamphlet. My recommendation was never attended to, only laughed at, and the pamphlet was speedily forgotten. Dr John Grove, of West Hill, Wandsworth, London, soon afterwards published a pamphlet, in which he recommended sulphur and soda combined. He

showed that this combination had been apparently successful even in the *treatment of cholera*; and I see by the advertising columns of medical periodicals that his pamphlet still holds its ground in the market. But I soon found on making trial of small doses of sulphur as a remedy that it could not be depended on. Given in diarrhœa, threatening cholera, it did good. But when the least failure occurred in the respiratory power, then the sulphur could not be oxidized and converted into disinfecting acid, and so it was worse than useless.

If infected clothing can be baked in an oven with a heat about 300° , it will be completely disinfected. But an oven suitable for the purpose cannot often be found, and therefore I strongly advise everybody to try the vapour from burning sulphur. It may be well here, however, to state that this kind of fumigation often fails to do as much good as it should, because people forget or do not know that sulphurous acid gas is twice as heavy as atmospheric air, and is therefore diffused through an apartment very slowly when the burning sulphur is on the floor. To ensure success one tin dish at least of the inflamed sulphur should be placed on a high shelf, or suspended within two feet of the ceiling; and another, or more, should be placed about three feet above the floor. Then the vapour would pervade the place thoroughly, and find its way even into presses and drawers.

While on the subject of sulphur, I would ask, are we likely to benefit or suffer by insisting by Act of Parliament on the suppression of mineral acid vapours from manufactories? The hundreds of tons of acid discharged throughout the year in the form of gas all over the country must have done good to the air of town and field. Some amount of vegetation was doubtless injured by acid vapour in the vicinity of such works, but the air must have been much improved for the breathing of men and animals. Plants live and thrive on ammonia. Animals are depressed and injured, and even killed by air constantly impregnated with it, partly through the lowering effects of the gas itself on animal life, and partly by its being a vehicle for zymotic agents. Our towns have always abounded in ammonia. Our fields for years past have had more ammonia in the shape of guano and other manures put on them than the fields of any country in the world. The air everywhere must have more ammonia in it than it had forty years ago. The quantity

may be too small to be detected by the tests of the chemist, but men and animals are, as physiological tests, the most delicate tests of all, and I strongly suspect that increase of ammonia in the air and also in the water, from the great extent of field draining allowing it to be washed by rain rapidly into the rivers, has been at the bottom of many of our recent troubles among men and cattle. All things that are disagreeable to the senses are not necessarily nuisances. By forgetting that fact we often make great blunders in trying to secure our comfort. We dislike cockroaches, and therefore drive them from our houses. Then we find we are eaten up by bugs. After a while the cockroaches return in spite of us, and the bugs vanish. And so it seems to be with the acid vapours we try to suppress. Would it not be a wiser plan to insist on the daily clearance away of all refuse vegetable and animal matters, the ammonia-formers, from towns at least, before we interfere with the diffusion of the acid vapours?

The clothing and bedding of cholera patients should be disinfected at once by being thrown into water, containing some disinfectant. Carbolic acid should, I think, be preferred for the purpose, because liquids containing a fixed alkali like potass, as in Condly's fluid, or an alkaline earth like chloride of lime, begin to occasion a fresh disengagement of ammonia when the oxygen and the chlorine have been expended. Chloride of zinc solution, Burnet's disinfecting fluid, appears to me to be next to carbolic acid in value for general use. It is a very certain and very permanent disinfectant, but I cannot recommend its introduction into any house, knowing as I do what awful results it has occasioned when accidentally swallowed.

Much has been done of late years in most of our towns to make them unfit for the germination of cholera. Great efforts are made to get rid of nuisances when the disease is just commencing in any place; but I think that we often do more harm than good at such times, because we adopt wrong means for attaining the desired end. Are we acting according to the prudent suggestions of common sense when we disturb decomposing heaps and pitfuls of filthy ammonia-formers when cholera is threatening? Would it not be better to saturate such nuisances with solutions of cheap metallic sulphates, as sulphate of zinc or iron, and then leave them undisturbed and harm

less till the zymotic storm has passed away? Are we right in advising people to apply lime wash to dirty walls, and throw lime on dirty places at cholera seasons? Are we not thus not merely putting white dirt over black dirt, as the late Sir George Balingall of Edinburgh used to say to his pupils, but also decomposing the organic matters, and so setting free and charging the air constantly with ammonia, thus so making it a better conveyer and diffuser of cholera essence? Would it not be more prudent at such times to wash the walls and floors and streets in doubtful places with solution of sulphate of iron, and so fix the ammonia of the organic matters of the dirt while we disinfect by the solution at the same time? The streets of the town in which I am now writing were covered thickly with quicklime, till they were white as from snow, while cholera was raging in 1832. The disease spread more and more, and did not cease till a heavy thunder rain carried the lime and all the filth of the air and streets into the sea.

But no amount of cleaning and disinfecting can ever keep houses free from cholera if they have too many occupants in proportion to their capacity for air, and have not efficient means for its continual renewal. Animal matter *will* accumulate from the breath and perspiration of the sleepers in badly aired places, and the best cleaned walls and floors will soon again be saturated with it, and continually disengage ammonia to dissolve and float, and give energy to the cholera essence. The prisoners in the jail of Taunton, who had 800 to 900 cubic feet of air each, and whose cells were systematically ventilated and warmed, had not a case of cholera among them, nor one even of diarrhoea, in 1848, while cholera was raging in the overcrowded, badly-ventilated workhouse, and diarrhoea was prevalent in the town. In the awful mortality in the establishment for pauper children at Tooting, the greatest of the evils which occasioned it was the insufficient space allowed to each of the fourteen hundred children at night. "The numbers crowded together in the dormitories were so great that each boy had only 150 cubic feet and each girl 133 cubic feet of air allowed for respiration; and some of the apartments were at the same time so faultily constructed—there being windows on one side only—that no effective ventilation could possibly be kept up. And what was the result? At a time when no case of cholera had occurred in the neighbourhood, and

when indeed even diarrhœa was not at all prevalent in the village, three hundred of the inmates of this establishment were smitten with the secret pestilence, and of these no less than one hundred and eighty died. The girls—whose dormitories we have stated were the most over-crowded, and were the worst ventilated—suffered more severely than the boys, although the former, as is usually the case, were altogether in better condition as to general health than the latter.”*

In addition to all the precautions hitherto recommended to be taken against cholera, I would strongly advise re-vaccination. Vaccination, be it ever so well performed, and the constitution at the time brought ever so perfectly under its protective power, loses its influence on the system in about seven years, according to the opinions of the best authorities. As we know that great changes are effected in our bodies at every septennial period, it is but reasonable to conclude that the protective power of the cow-pock does not remain perfectly good for more than one of such periods, and that vaccination should be repeated as each period draws to a close. But vaccination is not always perfectly performed, and the constitution is not always influenced by the operation. It is a trifling operation in appearance, but great interests are involved in the mode of its performance; and a pure and efficient lymph is so difficult to be got, we cannot be surprised that, while many are marked, many do not obtain the proper mark, and some remain quite unprotected. Even with the best lymph, the simple fact of whether the lancet is pointed downwards, when passed under the cuticle, so as to make a little pocket that will retain the lymph till it can be absorbed and affect the constitution, or pointed upwards so as to make an opening which will let the lymph escape, will go far to determine the success or failure of the operation as a means of constitutional protection. Moreover, the vaccine lymph now in circulation becomes less energetic every year through want of renewal direct from the teat of the cow. When just taken from the cow, it is so energetic that it occasions rather severe irritation on the arms of children on whom it is employed. That is the kind of lymph required for the re-vaccination of tough-skinned adults. It is not fit for children till it has been passed through three or four healthy grown-up persons. Every man should take care that he and

* *Medico-Chirurgical Review*, vol. vii., p. 8.

his dependents are re-vaccinated every seventh year at farthest, and that none but regular practitioners be entrusted with so onerous a duty. Vaccination and re-vaccination may not protect from cholera, that has to be proved, for as yet there is merely an impression, though a very strong impression, on my mind that it does so if perfectly performed; but he who is well and recently vaccinated has at least the satisfaction, and a great satisfaction it should be to any man, that he is proof against that scourge the small-pox.

In the debate in the House of Lords on 24th July of this year, the Duke of Buckingham stated that the Bill now in the House of Commons on the subject of vaccination is to receive the attention of Government during the recess, and will likely be brought forward next Session. Would it be interfering too much with the liberty of the subject were a clause inserted in that Bill, making re-vaccination imperative every seventh year from the date of each person's birth? A bill was passed in July 1855—18 and 19 Victoria—making it compulsory on all adults, not protected by vaccination or an attack of small-pox, to undergo vaccination. “Yet with all this, it is most unsatisfactory to find that the intentions of the Legislature are being imperfectly fulfilled—so imperfectly that, according to Mr Simon, the public defences against small-pox are in great part insufficient and delusive.”*

If this Tract be read by any non-medical person, I would wish him to understand that what I have said here is not intended to divert attention from the general and personal hygienic precautions against cholera recommended by all medical men. Every person of ordinary intelligence should read, re-read, and act up to the instructions in the memorandum by Dr John Simon, the medical officer of Her Majesty's Privy Council, dated 24th July, 1866, and printed at length in the *Times* of the 25th of that month. And every one who does read that very valuable document should endeavour to induce his neighbours, as well as his own family, to act according to those instructions. Even when a man knows he has no gunpowder stored in his house he cannot be comfortable if he be aware that the parties next door keep full magazines. And so with dirt and bad ventilation. Your house may be pure in itself; but if your neighbour's house

* The Practice of Medicine, by Thomas Hawkes Turner, M.D., &c., &c. Fifth Edition, pp. 192, 193.

is in bad sanitary condition, his foul airs may reach you ; and if the cholera essence spreads in his very suitable abode, it may reach you also, especially if the wind blow from him to you. In sanitary matters we should all be our brother's keepers, and keep those about us from harming themselves and others by any of that neglect of, and indifference to, common-sense precautions which are always to be reprobated.

Till the experience of the medical profession is found to be the opposite of mine, and opinions are expressed decidedly contrary to my views, I think it would be but prudent to ascertain that persons selected for attendance on cholera cases have been thoroughly and recently vaccinated. Poek-pitted persons should also be preferred as nurses for cholera whenever they can be obtained. I am quite aware that tho very smallness of the number of nurses who are attacked with cholera may be accounted for to some extent by leaving out all ideas of protection by varioloid or vaccine, as many persons have the constitutional power of perspiring off the cholera poison almost as fast as they inhale it, provided they are enthusiastic, energetic, and free from fear and fatigue. But I know that when the spirits flag, and the body is weary, the organic powers begin to flag also, and whatever of an injurious nature in the air is inhaled is not at once expelled, but lingers in the system, and then comes the danger. So long as nurses are not engaged in a cholera atmosphere more than three or four hours at a time, have not more than ten or twelve hours' work per day, enjoy their food and sleep, and have perspiring skins (a continued dry skin is a warning in cholera seasons), so long have they little likelihood of taking the disease. But much and varied observation will be required to determine whether that wonderful unsusceptibility, that remarkable resistance to the poison, so often seen among attendants in such cases, is an original gift of constitution born with those persons, like the unsusceptibility of some to small-pox, or is a power acquired through changes wrought in the system by vaccination. My own conviction is that the unprotected have but small power of resisting cholera essence when they receive it through any channel, especially when they are in any way exhausted.

Governors of hospitals should provide open carriages for their nurses to have a drive in turn once a day at least. Their persons would thus be well-ventilated and

refreshed, and their spirits would be strengthened by their minds being taken off their depressing work for a time. The public would soon see the propriety of a step of the kind, and the little extra expense would quickly be made good. Nurses should also have a warm bath every day. It is true economy in the long run, as well as kindness to the sick themselves, to take every care of nurses, and keep them in mental and bodily vigour.

I would now offer, with all deference to my more experienced medical brethren, a few suggestions on the treatment of cholera cases ; touching, however, as I have done in speaking of prevention, only on a few points which I fancy may not have occupied much attention.

The first important matter is the bed. If possible it should be a thin mattress split along the middle a length of twenty inches, and the split kept widely open by a tape passed under and over each side of it, and fastened to each side of the bedstead. The bedstead should have an opening in its bottom five inches wide and twenty inches long. A wide pan, with about eight ounces of saturated solution of sulphate of iron,* or a few ounces of some other approved disinfectant, should be placed on the floor below the central openings. Old sheets folded may be so disposed over the mattress so as not to cover the opening. The cot described by Sir J. D. Corrigan in his little book on fever would do admirably for cholera patients. It is on the plan of the tape cot or charpoy, used so extensively in India, being a mere frame with broad strong tapes stretched close together from end to end and side to side. There is an opening for dejections.

Bed clothes are of little use in the majority of cases, for the sick toss them off in their restlessness from exhaustion and morbid sense of heat, from perverted sensibility, regardless of any risk of personal exposure. Patients of either sex should have on wide loose flannel drawers, ten inches too long in the legs, so as to extend beyond and cover the feet. This is better than having socks for warmth, for if the feet and legs have to be treated for cramps they are easily uncovered. The drawers should button in front, and be slit from the fork to the middle of the back. A loose flannel jacket completes the dress. No amount of tossing about can displace such coverings, and there is a clear run for all de-

* Recommended by Pettenkofer. See Manual of Practical Hygiene, by Professor Parkes. Second Edition, p. 450.

jections into the pan below the bed. The old-fashioned bed pan, and the modern waterproof sheet, are thus rendered unnecessary. The former disturbs the patient, and very often he cannot use it. The latter keeps him in a constant slop dangerous to himself and others.

The apartment should be airy, and the temperature low. Cold revives, and does not injure one in the cold stage of cholera. The surface of such a case is colder in the hot land-winds of India than in cooler atmospheres. More oxygen is imparted to the blood in cold air in the difficult respiration of cholera than by an equal volume of heated air, and no degree of heat can warm the algid body. Nothing but cessation of the organic constriction of the finer bronchii, so as to let more air into the lungs, and of the constriction of the pulmonary and systemic capillary blood-vessels, so as to allow the blood to be everywhere freely exposed to the air, can ever restore the vital heat of the now icy body. Heat, however applied, merely increases the sufferings of the patient, by increasing his already high irritability, the highest seen in any disease, and so quickens his pulse and increases the viscosity of his blood.

The apartment in which a cholera case is treated should be occasionally fumigated, however well it may be ventilated, because you cannot in this country have windows at all times sufficiently open to keep up a current of air in the room without risk of injury to the more or less heated attendants. I have often in India tried the simple plan of dropping hydrochloric or nitric acid, or both, into a hot gallipot, so as to occasion fumes, when the air has been stagnant; but I think now that sulphurous acid gas is a better fumigant, because it can be effected easily by any one burning a sulphur match occasionally in various parts of the room. In this way it can be done gently, and with pleasure rather than hurt to people's lungs. There should be just enough of sulphurous acid gas occasionally to be bearable by the attendants, and then no injury can be done by it to the sick. And we should be aware that those in the cold stage of cholera may easily be hurt by an overdose of acid vapour in the apartment, because the nasal passages and throat and glottis and bronchii are all devoid of sensibility, and the strongest acids often don't make the patient sneeze or cough. I wish some ingenious fellow would contrive a candle that would give off sulphurous acid gas slowly.

Such candles would be very manageable, and we might light a few for a minute or so at a time in any part of a sick chamber.

Fanning the patient's face is always agreeable to him, as movement of the air about him is thus ensured.

The next important matter to attend to is the prevention or arrest of cramps. While they continue the patient's strength is rapidly lowered by the intolerable suffering, and the medical attendants and nurses are always somewhat unnerved by his cries, and unfitted for accurately ascertaining his actual condition, and ministering efficiently to his wants. Friction does no good in cramp. As cramps intermit, the intervals between them are erroneously supposed to be owing to the friction so generally employed. The cramps recur at intervals for a *certain* time in all cases in which they occur, in spite of frictions or any application but pressure. Keep down the centre or belly of a muscle so that it cannot curve up, and then there cannot be any contraction whatever. To do this effectually in the legs, provide a number of strong cotton straps each a yard long or thereabouts, and spread one side with soft sticky adhesive plaster which will adhere easily at a rather low temperature. Each strap should be two inches broad for small legs; but if the calves are full and rise abruptly, the strap must not be more than one and a-half inches in breadth, in order that it may be applied easily. If the patient is a man, a Plantagenet guard-razor should be at hand to take the hair rapidly off the legs, so as to allow the straps to be easily removed afterwards. Apply one end of a strap between the calf and ancle, and carry it upwards round and round the leg in a spiral, taking care to pull very hard when you are near the belly of the calf, so as to bind it firmly down. The strength of pull must, of course, be proportioned to the muscularity of the limb. Two straps, at least, will be required to bandage nearly to the knee. If cramps are threatening in the feet, put a pellet of tow between every two toes, and a firm ball of tow as big as a fist under the hollow of the foot, and then apply the same kind of plaster strap firmly round the foot from the base of the toes to the ancle. If cramps begin in the forearms and hands, treat these extremities in the same way, minding the tow balls and pellets for the hands. Cramps do not often affect the thighs; but, when they do, the only plan to arrest them

permanently is to apply three short, slightly padded, wooden splints of the ordinary breadth to each thigh : one on the inner side, one outside, one behind. Apply a good screw tourniquet strap round the splints, and buckle it firmly. Then screw the tourniquet sufficiently to prevent the rise of the muscular centres. The brass work must, of course, be a little to the inner side of the thigh to allow the patient to toss about. If cramps appear in any other parts they must be stopped by pressure with the fingers or fist ; but they very seldom occur in other parts. If plaster straps cannot be obtained, a handkerchief should be firmly tied over the centre of the leg and centre of the thigh ; but such a method is a poor inefficient substitute for strapping. There is an odd thing about the action of such straps in cramp cases that I have never been able to account for satisfactorily. They are generally borne well, and the patient keeps them on till reaction is well advanced. But sometimes great complaint is made of the pressure they occasion. In such cases, of course, I have been obliged to remove them, however short a time they have been on, for it does not do to fret a patient in a disease of such terrible irritability as cholera, and then I have always found that the temporary even pressure has finished the cramps, and they never return. We know that cholera cases have given electrical shocks to those touching them, and we know that some people in particular states of the air observe electrical crackling and luminosity when they pull off their silk stockings at night in a darkish place. Can it be that the withdrawal of the plasters discharges superabundant electricity from the limb, and so quiets the muscles ? If that be the explanation, any good conductor from the limbs to the ground should also arrest the cramps.

An emetic sometimes does much good at the commencement of the cold period, and occasionally even when that stage is so advanced that the person is pulseless at the wrists. A thoroughly good fit of vomiting at the very first, through the aid of an emetic, not only helps to expel blood impurities by various channels, but often brings up offending matters from the stomach when the patient and ourselves least expect their presence. During seasons of epidemic cholera many who never have any decided bowel derangement or cramps as others have, are sensible that digestion is considerably impaired, and some articles of diet remain a long time in the stomach. A friend of

mine, a very strong athletic man, some years ago, experienced a feeling of dyspepsia at such a season, and took a common mustard emetic. To his surprise it brought up several bits of bacon cut from a knuckle of ham, and swallowed a whole fortnight previously. Therefore in many cases of cholera it is a safe plan, before we begin with what we may consider actual remedies for the disease, to give an emetic, that we may be certain our medicines have fair play by being employed on a clean foundation. There cannot be any objection to ipecacuanine in a dose of three-fourths of an ounce, sharpened with eight or ten grains of citric acid or half-an-ounce of lemon juice.* But one or two teaspoonfuls of good mustard in half-a-pint of tepid water constitute a better emetic for weakly people. In this way we get the worst of the vomiting over at once, instead of letting it go on for hours in an imperfect manner, and so weakening the patient. Imperfect vomiting almost invariably exhausts the sufferer very much. Full free vomiting, with plenty of fluid to vomit, often thoroughly rouses the vital powers, and gives a favourable turn to the disease, provided the patient will allow himself to be well and warmly covered up when the emesis is finished.

If vomiting continue, notwithstanding the perfect clearing out of the stomach, then we should allay or moderate the gastric irritation by placing a large warm red pepper sinapism over the upper part of the abdomen and lower part of the chest. The paste for this purpose should be made in quantity, with one pound of good powdered mustard to four ounces of powdered *genuine* red pepper, and enough of cold water, and kept ready for use. It does well enough when spread to the thickness of a penny on any strong paper; a piece of newspaper will do. The sinapism should then have the chill taken off by being laid for two or three minutes on a warm plate, but not long enough to drive off the pungency. To save the trouble to nurse and patient that the washing of this stuff from the skin would occasion, a cambric handkerchief wrung out of hot water should be laid on the abdomen, and the paste plaster turned down over it. When the patient can no longer endure the plaster, the handkerchief has only to be lifted with it, and the skin is left clean.

If the exhausting retchings and vomitings are not miti-

* Nevin's Analysis of the Pharmacopœia, p. 232.

gated decidedly by the mustard, fifteen to twenty drops of tincture of opium should be mixed with half a wine glassful of the ordinary prepared starch and given as an enema, by means of a small glass syringe, immediately after a dejection. The enema should, if possible, be retained. Opium in this direction is not objectionable in the cold stage like opium by the stomach, as it never acts injuriously on the brain when so given in moderation.

Heat and frictions to raise the temperature of the extremities only fluster and add to the dyspnoea of the patient, and exhaust him by increasing his irritability, and so increasing the quickness of his pulse and the embarrassment of his respiration. Don't jump to a conclusion, and say I write absurdly when I aver that when the cold stage is fairly established, and all prospect of reaction over for an unknown time, it would be safer and wiser to ice the patient's skin, just as we ice his stomach when we can get ice drinks for him, than to attempt to raise his temperature by external heat. The patient himself craves cold to his skin. All attempts to induce warm perspiration by heat should be abandoned for a time, when the cold stage is well marked. I have somewhere read a story related by a Dr Bell, which throws some light on the treatment in this stage. He had halted at one of the dirty caravanserais, or travellers' rest-houses, when he was journeying in Persia. Night was coming on, snow was falling, and the air very cold. Two travellers had apparently just died from cholera. Their bodies, lifeless it was supposed, were removed to a summer house in the cold bleak garden. In the course of a few hours there was a demand for admission to the serai, and to the astonishment of all, the two supposed corpses walked in and claimed shelter and assistance. The cold had induced a complete reaction, which the previous heat of the serai had failed to bring on. Much might easily be written on this part of the subject.

We have got our patient to bed, and we shall suppose we have relieved him of the worst of the cramps and vomiting, and placed him so that he can part with dejections readily without any exertion. What are we to do now by way of actual treatment for the disease? Like other medical men I must confess that I do not know of any remedy that can really be relied upon to benefit a man in the cold stage of ordinary Asiatic cholera. Plenty of cold water to drink, not withholding it for any

time so as to harrass the patient, nor giving more than one or two wine glassfuls at once, lest he should get a sudden shock, and taking care to give it to him in a teapot or cream-jug, or better, of course, a drinking cup with a spout, so that he may not raise his head, and so die by fainting.* Plenty of weak very cold chicken broth seems to be often preferable to water, as it must occasion a less rapid exosmosis from the intestinal capillaries. And this is often of much consequence, as it is not so much the quantity of fluid lost by the system as the rapidity with which it is lost that determines the amount of the shock which the serous purging can further add to the already shaken system. A soup about the specific gravity of the serosity from the bowels must be the best. It must, therefore, be a very weak soup.

I have no faith in medicine exhibited in the cold stage of ordinary cholera, such as is seen pure and simple in inland parts of any country where the land is dry and clean, and where the patient taken with cholera has not at any time of his life suffered from the effects of marsh or any similar miasm. For such uncomplicated cases of cholera there is no better treatment in the cold stage, so far as I am aware, than what I have already advised, with a little wine or brandy added to the broth or water when there is faintness, or the person is very anxious for either, as the discharges go on—simple plans of the kind, with that very necessary addition of steady, kindly, attentive, but not meddlesome nursing, are about all that can be actually recommended in such cases in the present state of our knowledge. So far as I am aware, Bromine has not been tried in this disease; yet it promises well in the cold stage, as it is a warm, not unpleasant stimulant, as well as a powerful decomposer of animal emanations. I have never tried it in cholera, but from the remarkably good effect I have observed it has in warming the skin, and slowing and filling the pulse in other diseases, attended with coldness and clamminess, and small rapid pulse, I think it might be used with advantage in the cold stage. It does not act well when given diluted with glycerine, as recom-

* Death by fainting almost never happens at any other period than the commencement of reaction. As the capillary constriction is then subsiding, the blood is rapidly allowed to leave the previously over-charged and labouring weakened heart. The least raising of the head at that time is apt to cause instant death. Broth should be given in greater quantity as the capillary constriction ceases.

mended in works on *Materia Medica*. It is better dissolved in a solution of carbolate of lime thus :—Carbocate of lime eight grains, water two fluid ounces, mix ; then add one fluid drachm of bromine, and agitate. A half to one fluid drachm of this solution would have to be given every half hour in four ounces of cold water to afford it a fair trial. The vapour from this solution might also be inhaled with benefit when the breathing is becoming affected. Hydrobromic ether should also be tried. It would be more diffusible, and penetrating, and quicker in decomposing any septic poison than the former can be. Sulphurous acid solution should also be tried. If a sulphurous ether could be obtained it would be equally deserving of a trial.

What shall I say about the method of treating cholera patients in the cold stage by castor oil purgation ? I can readily see the propriety of exciting disturbance in one set of organs to act as a revulsive to the disturbance in others ; but I cannot understand how the case is to be benefited by adding an irritation to a part already irritated. Castor oil is certainly a soother when applied to surfaces in a state of irritation, as we see when it is dropped into an inflamed eye, or applied to a painful blistered or ulcerated part ; but we know also that its purgative effects, like those of other medicines, by wearying the organic nerves and muscles, render us very feeble if they are continued. A weak man is certainly strengthened by taking out of him anything that has been the cause of his weakness ; but is the forcing off of more serosity by the intestinal capillaries a safe way of getting out the cholera essence ? A great deal of the essence is doubtless carried off by that channel in most cases, but a large number of cases expire under the process, and in those that survive we find usually that much has to be done by the secreting organs when they resume their functions before the patient can be said with certainty to be clear of the poison. Sydenham described a very serious cholera that occurred in 1669, though not quite the Asiatic out and out. “The pulse is quick and frequent, at times small and unequal. The feeling of sickness is most distressing, and is accompanied with heat and disquiet. The perspiration sometimes amounts to absolute sweating. The legs and arms are cramped, and the extremities cold. To these symptoms, and to others of a like stamp, we may add faintness. The disease terrifies

the lookers on ; and sometimes proves fatal within twenty-four hours." Now, mark what he says immediately after about the treatment—"By careful reflection, by observation, and by the results of a manifold experience, I have thoroughly convinced myself that to expel the acrid humours, the focus of the malady, by cathartics, is just to add fuel to flame. The mildest operation of the mildest purge disturbs the whole system, and induces fresh commotions." To show that he was against the use of astringents as much as purgatives, and had no desire to have the supposed poison or irritant retained in the system, though he would not purge it out, he continues—"On the other hand, by checking the impetus of the disease at its outset, I should wear out the patient by an intestine war, while I should just confine the enemy to his seat in the bowels, should impede the natural evacuations, and detain those humours which were seeking for an outlet. For these reasons I keep a middle course. In part I evacuate the humours, in part I dilute them. By these means I reduce the disease to a manageable form." * And then he goes on to tell us that he effects the required dilution and evacuation by copious draughts and enemata of very weak chicken broth very weak indeed, for there was to be only one tender chicken to three gallons, or thirty pounds, of spring water.

What we have to dread while the serous purging is progressing is the coma from exhaustion, which sets in when much fluid has been evacuated. Intestinal irritation occasions exhaustion, and any case of exhaustion, however induced, is very apt to present a marked degree of intestinal irritation and diarrhoea. This is altogether apart from cholera. How much more likely then are we not to have the sinking tendency increased in the cold stage of cholera by a purgative irritant and depressant thrown in in addition to the poison which has set up the disease. That common sense which Sydenham seems to have possessed in an eminent degree, and which ruled and directed his medical sense, assures us, I think, that if the poison is to be eliminated by the bowels, its evacuation should be encouraged by dilution, but not by additional intestinal irritation. When I went to India in 1840, I found that the old medical residents in the country approved of purgatives in cholera, but like experienced men they kept them for a particular turn of the

* Sydenham's Works, already quoted, vol. i., pp. 163, 164.

disease. They watched till the white of the eye began to show a few red capillaries, indicating that the constriction of the vessels was passing away, and congestion apt to occur. They noted also the re-appearance of air in the intestines, a sign that intestinal organic muscular constriction was subsiding, and that proper glandular secretion would begin. Then they gave their purgative, and added plenty of weak broth, tea, and a little wine, if they had not been given sooner. The purgative was usually compound jalap with calomel, rather a bad choice, but strong purgatives were generally chosen in those days when purgatives were required. They did not do things by halves at that time, but did them better than the out and outers of the present day. Of late years most Indian practitioners employ the milder purgatives when reaction is commencing, and rhubarb powder, half a drachm to a drachm, with grey powder, twenty to thirty grains, is found to be a very good and safe form. Sometimes I have added twenty to thirty grains of finely powdered charcoal, of course at the same time diminishing the rhubarb to which the charcoal gives energy. Sometimes a little quinine has been found advisable in this powder. That is in my opinion a safe and proper practice, and very different from that of giving purgatives to encourage mere serous exudation. Some may say, why object to purgatives in the cold stage when you approve of an emetic being given at its commencement, or as soon as possible afterwards. I say the emetic is not given to eliminate the cholera poison, though it doubtless causes the organism to throw off some by various channels. It is administered solely with a view to getting rid of any undigested matters which may be adding to the vomiting and to the depression, and it often does so much good at once by rousing and diffusing the vital power that we find the pulse in some of the worst cases return to the wrist, so as to be easily felt soon after the emetic has acted. We cannot, I am sure, say as much for the effects of purgatives in collapse.

In the cold stage we can get rid of the cholera poison only in one of two ways. We must neutralize it or destroy it, so as to prevent it from further irritating the vaso-motor division of the sympathetic ganglia, and so keeping up organic fibre constriction of the capillaries, so arresting secretion, and from keeping up constriction of the finer bronchii, so impeding or perhaps arresting oxygena-

tion ; or we must let the poison find its way out of the system by the capillaries it seems to select and prefer—those of the intestines and skin—and then dilute it, and wash it out with mild fluids. When reaction, and with it some degree of secretion, is setting in, then we can solicit the secernent organs to do their best to clear away the rest of the virus.

What would be our opinion of any method of treating small-pox, which would require the skin to be stimulated, to perspire more than it does at present? We had enough of that not many years ago, and we know how the cases generally ended. It caused a very great loss of life by exhaustion coming on usually just when the pocks should have been matured. And what would we say if any one were to declare that purgatives should be given in inflammation of the kidneys or the small intestines? Would we put away the enterites and nephrites, and the sinking they occasion, by frequent moving of the bowels? Every medical man knows we would not, and that the prostration would soon end in death if we did. Yet inflammation of the bowels does not occasion so deep a collapse as the awful irritation in cholera does.

As for purgatives preventing constriction of the lung capillaries, and bronchii coming on in the course of the cold stage, I feel very confident they cannot do anything of the kind. The vaso motor and bronchio motor ganglia of the thorax have always seemed to me to become involved in the irritation by the gradual spreading of it from the abdominal ganglia along ganglionic nerve filaments. Difficulty of breathing comes on always sooner or later after serous purging and vomiting begin, unless reaction be induced. Sometimes, though very rarely, we find the thoracic organic fibres involved, and difficulty of breathing and anxiety commencing just as purging and vomiting are begun. And this seems to be only in those instances where the patient has suddenly *inhaled* a large dose of the poison. Such cases are very speedily fatal. One I saw in a strong European terminated in little more than four hours. A pneumatic medicine, such as Bromine vapour, or sulphurous acid, would probably be the best for such terrible emergencies. If we had a severe case of vomiting, purging, distressing thirst, feeble quick pulse, cramps, and loss of voice, from poisoning by a large dose of tartar emetic, we would not dare to try to eliminate it by purgatives. A stimu-

lant emetic has been required in some such cases to start the semi-paralyzed stomach into action ; but a purgative has never been required, so far as I am aware. And, if painful respiration came on after a time, in such a case, I think that then, especially, we would see the necessity of avoiding to give anything that would further depress ; and in all such cases we would content ourselves with diluting the antimonial salt, rendering it inert by antidotes, at the same time supporting the system by mild nourishment, strengthening the heart by wine and ethers, and calming irritation by gentle sedatives. But why reason further on this part of my subject. Dr George Johnson gave castor oil a trial in 1854, and strongly advocated its use. " The Medical Council of the Board of Health, after investigating several cases treated by this agent, report, on 20th September, 1854 : ' From the above abstract, the details of which have been carefully investigated by the Committee, it appears that, in 89 cases of cholera, treated by fourteen different practitioners, with castor oil, on the plan recommended by Dr Johnson, 68 were fatal ; recovery having occurred only in 15 cases, while 6 remaining cases are still under treatment.' " * Surely that is sufficient.

Much of the treatment of ordinary cases in the cold stage should be expectant—waiting and hoping work, not working work. In cases with red-edged tongue rapid improvement often ensues, even when much flocculent serosity is passed, on the exhibition every half hour of the simple effervescing draughts, made with what are called soda powders, with the addition of twenty or thirty minims of tincture of henbane to each dose. But there is a very extensive class of cases furnished by people who have been at some time under the influence of paludal exhalations, or who are so at the moment of attack by cholera, and these require a very free use of quinine even in the cold stage. By people who have suffered from miasm, I do not mean only those who have had good shakes from ague, but those also who from residence in the neighbourhood of canals, estuaries of rivers, and offensive muddy foreshores anywhere, have been and are suffering from the chronic deteriorating influence of such emanations on their blood. I do not mean to say that cholera is actually an ague. Far from that. All I mean is, that a miasm which will in one situation occasion a

* Turner's Practice of Medicine, fifth edition, p. 495.

decided shaking, intermittent fever will in other places display its effects only by imparting the agueish character to other diseases, so that those diseases cannot be effectually treated unless the miasmatic deterioration and agueish peculiarities and tendencies are taken into account. It may safely be said that if a man has been immersed for any time in an atmosphere such as we have in low lying places in many maritime districts, all his future illnesses will be colored, so to speak, by the atmospheric effects of that residence. Ague has long since ceased to be endemic in all except a very few places in this country. But very many people are still being constantly poisoned by emanations which occasion chronic degenerations similar to the paludal. We have not now the acute forms of marsh or moist-ground poisoning in our midst, but we have, I think, several masked chronic forms that can be detected or suspected by the medical practitioner. I know in India that if cholera commence with some little shiver, some slight tremor, followed by dry heat of skin, and at the same time what are perhaps regarded as very incompatible cramps and serous evacuations of Asiatic cholera, we are almost certain to save the patient by treating the case as one of ague, and giving him quinine freely, whatever we do for the choleraic symptoms. If a cholera patient has a little tremor at the outset of the disease, or informs me he has had ague at some time, I give him quinine, with henbane or paregoric, however cold and clammy he may be, and I further help him by blankets, soup, and wine. If a patient has been long resident on a dirty part of a canal bank, or of a seaport with foul beach, I take it for certain that he has what is called latent intermittent in him, and that it may declare itself at any time either in the shaking or the neuralgic form, or he may be attacked with what may be named inverted intermittent, in the form of dropsy which increases distinctly every third or other periodic day, or in the form of intermittent or remittent diarrhoea, or of alarming serous flocculent vomiting and purging, which if not recognised as cholera of agueish character, but only considered as simple uncomplicated cholera, will most likely prove fatal. All such cases should be treated by quinine and camphor with or without a little opium, according to the necessities of the case at the moment. Pardon me when I say that Warburg's drops are a very good form, as I have experienced for such cases, when the drops are given according to the directions.

accompanying the little bottles. If the serous evacuations are in considerable quantity, especially if rosey from blood, the quinine should be given in doses of at least ten grains every half-hour with paregoric till the person's condition is improved. I do not know if the prescription proposed for cholera by Dr Copland, of Medical Dictionary celebrity, was intended for this description of cholera, as I have not his great work at hand; but it is most effective for the purpose. It is made up of ten grains each of sulphate of quinine, calomel, and camphor. The camphor is to be finely powdered in a mortar, after being moistened with alcohol, then the calomel and quinine are to be added, and all rubbed well together, with half a fluid ounce of mucilage or starch. When taken, it should be washed down with half a wineglassful of brandy in a wineglassful of water. It should be repeated twice or thrice, if necessary, in half the above dose, and when reaction is thoroughly established a mild purgative must be given. I think half the calomel is enough. Of course the remedy for cramp may be needed at the same time.

The next remark I desire to make is on the best means for restoring the functions of the kidneys after reaction has commenced. Leeching or cupping the loins is a favourite method with many medical men, but leeches and cupping cannot, in my opinion, influence the circulation of organs so deeply situated as those organs are. I believe that the almost prone position in which we are obliged to place and retain the patient while we are leeching or cupping the loins has more to do with the comparatively frequent success of this treatment than the capillary bleeding itself. When a man is on his back the kidneys are hanging down as it were on each side of the spine like panniers on a wall. The renal arteries let the blood flow easily downwards into the organs; the renal veins do not return it upwards quite so fast. The blood is therefore delayed in the Malpighian tufts, and the saline part of its fluid has time to percolate into the tubuli. If there is any block from constriction, or from congestive dilatation of the capillaries, or any other cause, the supine position increases it. A prone position of the patient does just the reverse, and favours secretion. Therefore I do not draw blood. I tell the attendants to place the patient as nearly as possible front downwards on the bed, with one pillow taken from under the head and placed under the chest. By

retaining him for a short time occasionally in that position, if he can bear it easily, the secretion will often be expedited. If it is slow in appearing, I recommend spirit of nitric ether 20 drops, solution of amorphous quinine 30 drops, diluted nitric acid 15 drops, with two fluid ounces of cold water to be given from a glass syringe as an enema every hour. A mixture of chlorate of potass 10 to 15 grains, spirit of nitric ether 30 drops, spirit of turpentine 15 to 20 drops, compound tincture of lavender 30 drops, syrup of orange peel half an ounce, water one fluid ounce, given every second hour as a draught, has been highly spoken of as a diuretic in obstinate cases. This prescription was given to me a short time ago by Mr Harvey, the Assistant in Chemistry in the Madras Medical College, but I have not tried it yet.

If any irregularity of breathing occur at any time after reaction is established, especially if the muscles of the neck begin to take part in the inspiratory pull, Dover's powder 3 grains, with James' powder 3 grains, may sometimes be administered with advantage every third or fourth hour. In some cases we find, just when we fancy the patient's life is safe, that he suddenly evinces irregularity in his breathing. It is almost always a fatal sign. Sometimes it does not appear till so late as the third or fourth day of seeming recovery. Some damage has in such a case been done to the medulla oblongata during the congestion of the cold stage, and while he is apparently recovering, that lesion is increasing, and suddenly disappoints our sanguine expectations. The above combination has, in my opinion, been the saving of three cases where pulling respiration *was commencing*. Of course, not a moment must be lost in trying something of the kind. Perhaps a couple of leeches just below the occipital protuberance might then be of service, or one leech at a time, till three or four have been applied, so that some drainage may be kept up. The liability to such unlooked-for terminations, during what may appear satisfactory convalescence, should make us refrain from asserting that a cholera patient is safe till we see him able to move about.

I need not offer any remark on the management of the whole stage of reaction. Any one who knows well how to treat the lower forms of fever knows how to treat this stage. So here I leave the subject.

16, Castle Street, Dunfries,

4th August, 1866.

